1. INTRODUCTION

Herbal medicine practice plays an important role in the primary healthcare delivery system in Ghana and in most developing countries. The world health organization (WHO) estimates that 80% of the population living in rural areas uses and depends on herbal medicine for their health needs (WHO Traditional Medicine Strategy, 2002). Herbal medicines are defined as any preparation containing one or more active herbal substances or herbal extractives. For majority of these preparations, the active principles or compounds are unknown. Among the first priorities designed by WHO in its strategy for Traditional Medicine, the study of plants for external use with antiseptic and wound healing promoting activity are emphasized (Akerele, 1984).

Many medicines including strychnine, aspirin, vincristine and taxol are origin of herbal or plant. In herbal medicine, crude plant extracts in the form of infusion, decoction, tincture or herbal extract are traditionally used by the population for the treatment of diseases, including infectious diseases. Although their efficacy and mechanisms of action have not been tested scientifically in most cases, these simple medicinal preparations often mediate beneficial responses due to their active chemical constituents (Barnes et al., 2007).
Medicinal plants are the backbone of the traditional medicine (Farnsworth, 1994). Over the years, interest in natural products has acquired a cyclic phenomenon. In many countries, including India and China, thousands of tribal communities still use folklore medicinal plants for the cure of various diseases. The great interest in the use and importance of medicinal plants in many developing countries has led to intensified efforts on the documentation of ethno medical data of medicinal plants (Dhar et al., 1968; Waller, 1993).

In the United States, almost 1800 medicinal plant species are commercially available (Muller and Clauson, 1998). It has been estimated about 13,000 species of plants, which have been employed for at least a century as traditional medicines by various cultures and around the world (Tyler, 1993). A list of over 20,000 medicinal plants has been published (Deans and Svoboda, 1990). Large number of the world’s flowering plant species have been used medicinally. Sometimes the figure of 70,000 medicinal plant species is cited, but this includes many algae, fungi and microorganisms that are not really plants as the word is understood by botanists. In any event, there is no other category of plants useful to man (with the possible exception of ornamental plants) that includes so many species and questions naturally arises, since such a staggering number of plants have useful medicinal properties.
Traditional medicines are used by about 60 percent of the world's population. These are not only used for primary health care just in rural areas, in developing countries, but also in developed countries, where modern medicines are predominantly used (Kamboj, 2000). While the traditional medicines are derived from medicinal plants, minerals and organic matter. The herbal drugs are prepared from medicinal plants only.

Indian systems of Medicine derive many of their curative tools from plants (Kumar et al., 2005) which are used as drugs. Information about these are often found in old literature (Atharvaveda, Charak Samhita, Sushruta Samhita, etc.). In spite of the many achievements of allopathic medicines, the Indian Systems of Medicine still continue to provide medical care to majority of the people on account of their cheaper cost with no side effects (Kokate et al., 2002). Herbal drugs obtained are safer in the treatment of various diseases (Ayyanar and Ignacimuthu, 2005; Sathyavathi and Janardhan, 2011).

Medicinal plants play an important role in supporting healthcare system in India. According to the World Health Organization (WHO), 80% of the rural population in developing countries utilizes locally available medicinal plants for their primary healthcare needs. About 90% of country's medicinal plants are found in forest habitats. Only 10% of the medicinal plants are distributed among other landscape sources like open grasslands, agricultural pastures and in fresh water
bodies, etc. It may be noted that, India is one amongst those nations which possess a historical track record of having made a significant global contribution by virtue of its traditional knowledge of the medicinal plants. India has rich medicinal plant heritage of 8000 species and an estimated 40,000 herbal formulations. If conserved and sustainably utilized global relevance. Thus there is an urgent need to conserve the wild populations of medicinal plant diversity in prioritized forest regions of India. Conservation of medicinal plants will contribute to self-reliance of millions for India’s own health needs (Trivedi, 2004).

Though India has rich biodiversity, among the twelve major diversity centers. The growing demand is putting a heavy train on the existing resources warning a number of species to be either threatened or endangered category. Southern India includes the two major bio-geographic zones the Western Ghats and Eastern Ghats. The Western Ghats region is known for its wealth in biodiversity and known as one of the 18 hot spots of biodiversity, which has recognized assess to the globe. It is estimated to harbor approximately 2,000 known medicinal species. Of the nearly 1,800 species of higher plants listed in the Red data book, 171 are known from Tamil Nadu (Botanical survey of India, 1988).

Tamilnadu has great potential for development of medicinal plants as a commercially viable venture. Its rich bio-diversity and varied agro-climate provide a conducive atmosphere for promotion of medicinal plants as a successful commercial venture. Most of these species are
restricted to Southern peninsula. Several workers were reported the utility of plants for the treatment of various diseases by different tribal and rural people inhabiting in various regions of Tamilnadu (Laila Banu et al., 2007; Shanmugam et al., 2011).

Despite of advent modernism in medicinal system in the 21st century, poverty-stricken and marginalized aborigine-folks (Tribals) of India, living in forest patches, particularly, which are still practicing the art of the use of crude herbal products as medicines (Ignacimuthu et al., 2008; Prasad et al., 2008; Singh and Singh, 2009). In tribal-India, the clandestine knowledge of ‘medicinal plants and their uses’ are transmitted down through the generations, which sometimes, becomes a risky affair due to advent modernism itself that affects the attention for knowledge on plants and their identification by young adults in forest floor (Ignacimuthu et al., 2008; Prasad et al., 2008; Singh and Singh, 2009).

Pharmacognosy as a subject of pharmaceutical curriculum focused on those natural products employed in allopathic system of medicine. Coincident with the increasing attractiveness of alternative therapies and the tremendous range of herbal products are now available to the public, regulatory requirements covering therapeutic plants which are introduced by many countries in order to control the quality of these products. Monographs are now available through giving description, test for identity and purity and assay of the active
constituents. It is still of fundamental important, particularly for pharmacognosy is the study of medicine derived from natural source. It is the study of the physical, chemical, biochemical and biological properties of drug substances of natural origin as well as the search of new drug from natural origin.

Pharmacognosy is interdisciplinary such as ethanobotany, ethanopharmacology, phytochemistry and phytotherapy. Phytochemicals from medicinal plants serve as lead compounds in drug discovery and design. Medicinal plants are rich source of novel drugs that forms the ingredients in traditional systems of medicine, modern medicines, neutraceuticals, food supplements, folk medicines, pharmaceutical intermediates, bioactive principle and lead compounds in synthetic drugs (Ncube et al., 2008).

The term pharmacognosy is derived from two Greek words 'Pharmacon' means drug or medicine and 'gnosis' means knowledge. Seydler (1895) first coined this term in his dissertation entitled ‘Analecta pharmacognosia’. Pharmacognosy is closely allied to medicine, developed during early nineteenth century as a branch of Materia Medica and applied biology. It is a study of drugs having their origin in plant and animal kingdom. The subject Pharmacognosy can also be expressed as an applied science that deals with biological, biochemical, therapeutic and economic features of natural drugs and their constituents. Tyler et al. (1981) defined that in a broad sense, Pharmacognosy embraces knowledge of the history, distribution, collection, cultivation,
selection, preparation, commerce, identification, evaluation, preservation and use of drugs and economic substances that affects the health of men and other animals.

In the earlier days, only the external morphological characters were used to identify a drug. As late as the beginning of the present century, Pharmacognosy had developed mainly on the botanical side, being particularly concerned with the description and identification of drugs both in their whole state and in powder form. Modern aspects of Pharmacognosy include not only the crude drugs but also their natural constituents and their derivatives. Like other biological sciences, Pharmacognosy has utilized related fields to bridge the transition from a descriptive science to a functional science. The various pharmacognostical methods are evolved to standardize crude drugs.

Therapeutic efficacy of medicinal plants depends upon the quality and quantity of chemical constituents. It has been established the chemical constituents of a plant species vary with regard to climate and seasons (Tyler et al., 1981). A plant species grown in different geographical localities are also shows the quantitative variation in their chemical constituents (Mallavarapu et al., 1995).

Phytochemistry, which evolved from natural products. Chemistry is confined to the study elaborated by plants, and it has developed as a distinct between natural product organic chemistry and
plant biochemistry in recent years. It deals with the study of chemical structure of plant constituents, their biosynthesis, metabolism, natural distribution and biological functions (Miller, 1973). The task of the phytochemist is compounded in accomplishing the characterization of very small quantity of the compounds isolable from plants. Phytochemistry also enjoys the application of modern research for the scientific investigation in all fields of life and civilization. Its direct involvement in the field of food and nutrition, agricultural medicine and cosmetics, is well known for years. Its contributions even in seemingly remote areas such as plant physiology, plant pathology, plant ecology, paleobotany, plant genetics, plant systematics and plant evolution has been increasingly felt.

One of the more encouraging trends as phytochemistry continues to grow and develop as a scientific discipline is the wider applications that are occurring in agricultural horticulture and forestry (Van Beek and Bretelar, 1993). As a result of the recent interest in the fractionation of plant extracts based on biological activity rather than a particular class of compound have been developed. The chemical examination follows after the isolation of the active fractions.

The phytochemical investigations of plants may involve the following: authentication and extraction of the plant material, separation and isolation of the constituents of interest, characterization of the isolated compounds, investigation of the biosynthetic pathways
to particular compounds and quantitative evaluation parallel to this may be the pharmacological of the separated components (Trease and Evans, 2005).

Phytochemistry is in the strict sense of the word the study of phytochemicals. These are chemicals derived from plants. In a narrower sense the terms are often used to describe the large number of secondary metabolic compounds found in plants. Many of these are known to provide protection against insect attacks and plant diseases. They also exhibit a number of protective functions for human consumers. Techniques commonly used in the field of phytochemistry are extraction, isolation and structural elucidation (MS, 1D and 2D NMR) of natural products, as well as various chromatography techniques (MPLC, HPLC and LC-MS).

Many plants synthesize substances that are useful to the maintenance of health in human and some animals. These include aromatic substances, most of them are phenols or their oxygen-substituted derivatives such as tannins. The fact that only less than 10% of about 7.5 lakhs species of plants on earth which have been investigated indicates the opportunity provided and challenges thrown open to phytochemicals. In many cases, these substances (particularly the alkaloids) serve as plant defense mechanisms against predation by microorganisms, insects and herbivores. Many of the herbs and spices used by humans to season food yield useful medicinal compounds (Lai, 2004; Tapsell, 2006).
Flavonoids belong to a group of polyphenolic compounds found in plants. They include monomeric flavonols, flavanones, anthocyanidins, flavones and flavonols (Waladkhani and Clemens, 2001). In addition to their free radical scavenging activity, flavonoids have multiple biological functions: antibacterial, antifungal and antiviral effects as well as being inhibitors of phospholipase A2, cyclooxygenase and lipoxygenase (Middleton and Kandaswani, 1992). Naturally occurring flavonoids are antiallergic, anticarcinogenic, antiviral and antioxidant (Close and Arthur, 2002). They show anti-inflammatory and anticancer activity (Okwu, 2005).

Many alkaloids are pharmacologically active substances, which exhibit various physiological activities in humans and animals. Alkaloids are very important in medicine and in the constituents of most valuable drugs. The use of alkaloid containing plants as dyes, spices, drugs or poisons can be traced back almost to the beginning of civilization (Roberts and Wink, 1998). Several alkaloids are still in use. Caffeine, a psychostimulant, is largely obtained from the decaffeination of Coffea species. Codeine (Papaver somniferum) is used as an antitussive (agent that suppresses the coughing reflex). Cocaine (Erythroxylum coca Lam.) is used as a local anesthetic (e.g. in eye surgery). Morphine (Papaver somniferum) is an indispensable analgesic (painkiller), used for treatment of severe pain. Quinine is used for antimalarial activity and remains on the market as antipyretic (fever suppressant). Alkaloids such as solasodine have been indicated as a starting material in the manufacture of steroidal drugs (Maxwell et al., 1995).
Plants produce a wide range of refuse-active secondary metabolites with antioxidant activity, such as ascorbic acid, carotenoids, polyphenols and enzymes, which protect the cells from oxidative damage. Over the past 10 years, there has been increasing interest in phenolic compounds and their role in human health and nutrition. It is well known, that Reactive oxygen species (ROS) formed in vivo, such as superoxide anion, hydroxyl radical and hydrogen peroxide, are highly reactive and potentially damaging transient chemical species. Tissue damage resulting from an imbalance between ROS-generating and scavenging systems which has been implicated the pathogenesis of a variety of disorders, including degenerative disorders of the CNS, such as Alzheimer’s disease, Cancer, Atherosclerosis, Diabetes mellitus, Hypertension, AIDS and aging (Halliwell and Gutteride, 1998; Mantle et al., 2000).

Antioxidant refers to a compound that can delay or inhibits the oxidation of lipids and other molecules by inhibiting the initiation or propagation of oxidative chain reactions, which thus prevent or repair damage done to the body’s cells by oxygen (Tachakittirungrod et al., 2007). They act by one or more of the following mechanisms: reducing activity, free radical-scavenging, and potential complexing of pro-oxidant metals and quenching of singlet oxygen. Epidemiological studies have shown that many phytonutrients of fruits and vegetables might protect the human body against damage by Reactive oxygen species (ROS).
In recent years, there has been a considerable interest in finding natural antioxidant from plants, particularly flavonoids and other polyphenols, have been reported to inhibit the propagation of free radical reactions, to protect the human body from disease (Kinsella *et al*., 1993; Terao and Piskula, 1997) and to retard lipid oxidative rancidity antioxidants has been questioned because of their toxicity (Valentao *et al*., 2002). Therefore, there have been numerous researches on these bioresources to seek potential natural and possibly economic and effective antioxidants to replace the synthetic ones.

Antioxidants found in biological system comprise a number of interconnecting and overlapping components, which include both enzymatic and non-enzymatic factors. Antioxidant enzymes primarily account for intracellular defense, while several non-enzyme molecules, small molecule weight antioxidants, protect various components against oxidation (Szaleczky *et al*., 1999).

Antioxidant defense mechanisms system against oxidative stress is composed of several lines and the antioxidants are classified into four categories based on function (Noguchi *et al*., 2000).

- First line of defense comprises preventive antioxidants, which suppress formation of free radical (enzymes: glutathione peroxidase, catalase; selenoprotein, transferrin, ferritin, lactoferrin and carotenoids etc.).
Second line of defense is the radical scavenging antioxidants suppressing chain initiation and/or breaking chain propagation reactions: radical scavenging antioxidants.

Third category: repair and de novo antioxidant (some photolytic enzymes, repair enzymes of DNA etc.).

A fourth line is an adaptation where the signal for the production and reactions of free radicals induces formation and transport the appropriate antioxidant to the right site.

Superoxide dismutase, catalase, glutathione peroxidase and glutathione S-transferase are the most important enzymatic antioxidants. Other antioxidant enzymes include hemeoxygenase-1, thiol-specific antioxidant enzyme and macrophage stress protein. The non-enzymatic antioxidants and other small molecules with antioxidant properties include reduced glutathione, ascorbic acid, α-tocopherol, β-carotene, uric acid and bilirubin. Metal ion chelators that sequestrate metal ions include haptoglobulin, albumin, transferrin, ceruloplasmin and metallothionein (Halliwell and Gutteridge, 1986). Synthetic antioxidants like butylated hydroxyl anisole (BHA) and butylated hydroxyl toluene (BHT) commonly used in processed foods have harmful side effects and carcinogenic (Hettiarachchy et al., 1996). In recent years, the use of natural antioxidants present in foods and other biological materials has attracted considerable interest due to their presumed safety, nutritional and therapeutic value (Ajila et al., 2007).
Stachytarpheta jamaicensis (L.) Vahl. belongs to the family of Verbenaceae. It is commonly known as seemai nayuruvi. This plant can be found on street and growing along roadsides. The disturbed sites, grass-fields, brushwood, young forest, watersides and moreover cultivated as a hedge-plant (Backer and Bakhuizen, 1968). Bluepotter weed is an erect and branched half-woody plant, 1 to 1.5 meters high. Stems are terete, the younger ones slightly angled. Leaves are elliptic to oblong-ovate, 2.5 to 10 centimeters long, with pointed tips and toothed margins, the base decurrent on the petioles. The spikes are terminal, rather slender, 10 to 30 centimeters long, 3-4 millimeters thick, green and continuous. Calyx is small, oblique and 4-toothed. Corolla is deep blue, 1 centimeter long. The fruit is enclosed in the calyx, appressed to and sunk in the rachis, smooth, oblong and about 4 millimeters long.

The medicinal usage of Stachytarpheta jamaicensis fresh leaves are consumed in bush tea as a “cooling” tonic and blood cleanser. S. jamaicensis is having anti spasmodic activity, anti-inflammatory activity, anti nociceptive activity, vasodilator activity, laxative activity, anti-diarrheal activity, antiulcer activity, antimicrobial activity, cytotoxic activity, analgesic, antihelminthic, diuretic, hypotensive, lactogogue, purgative, sedative, stomachictonic and vermifuge (Schapoval, 1998).
The plant is used for allergies and respiratory conditions such as colds, flu asthma, bronchitis and others; it is also used for digestive problems such as indigestion, acid reflux, ulcers, constipation, dyspepsia and slow digestion. Pregnant patients and patients with low blood pressure are advised not to use this plant because it is both hypotensive and abortive (Taylor, 2005). However, perusal of literature reveals that Pharmacognostic information for *Stachytarpheta jamaicensis* is totally lacking, hence in the present investigation was undertaken.

**Objectives**

1. To collect the selected medicinal plants natural habitats in Alappakam and Poondiyankuppam in cuddalore district, Tamilnadu.

2. To prepare crude extracts with different solvent systems.

3. Pharmacognostic standards like microscopy of leaf, stem and root, ash values, extractive values and fluorescence analysis.

4. Antioxidant activity of leaf, stem and root of *Stachytarpheta jamaicensis*.

5. Phytochemical analysis of leaf, stem and root.

6. To elucidate the structure of using $^1$H NMR and $^{13}$C NMR, GC-MS and FT-IR.